

PCBs May Impede IVF Success

Failed Embryo Implantation Linked to Exposure

Although banned from production in the United States and other developed countries in the late 1970s, polychlorinated biphenyls (PCBs) remain widespread environmental contaminants found in measurable amounts in the general population. These compounds have been linked to longer time to pregnancy and increased pregnancy loss in both epidemiologic and experimental research. A new study pinpoints failed embryo implantation in the uterus as a possible mechanism for these outcomes [*EHP* 119(7):1010–1016; Meeker et al.].

Between 1994 and 2003, 2,350 Boston-area couples undergoing *in vitro* fertilization (IVF) were recruited for a study of predictors of IVF outcomes. Study participants included women who underwent embryo transfer and did not become pregnant, those who had a positive pregnancy test but no fetal development (known as a “chemical pregnancy”), those who became pregnant and had a miscarriage (pregnancy loss before 20 weeks), and those who had a live birth. The study included 765 women and 827 IVF cycles resulting in 229 implantation failures, 177 chemical pregnancies, 124 miscarriages, and 297 live births.

Prior to their first IVF cycle, the women provided blood samples for measurement of PCBs, including 57 individual congeners. IVF outcome was assessed against concentrations of three individual PCB congeners (PCBs 118, 138, and 153), all PCBs combined (Σ PCBs),

and three separate PCB groupings (groups 1–3) based on structure and biological activity.

None of the individual PCBs or PCB groupings were associated with chemical pregnancy or spontaneous abortion. However, significant trends emerged for failed implantation and reduced odds of a live birth. PCB 153 and Σ PCBs were both dose-dependently associated with failed implantation, with the odds doubled in the highest quartile of exposure (>0.34 ng/g and >1.81 ng/g, respectively) versus the lowest (≤ 0.16 ng/g and ≤ 0.32 ng/g, respectively).

Women with PCB 118 and group 3 congener concentrations above the lowest quartile also were more likely to have a failed implantation than women with the lowest exposures, although the associations did not increase with each increase in dose. Odds of a live birth were lower for women in the highest versus lowest quartiles of PCB 153 and Σ PCB exposure, while PCB 118 and group 2 and 3 congeners were associated with smaller nonsignificant reductions in live births.

The study has several strengths, including its prospective design and PCB measurement at the start of attempted pregnancy. However, unknown confounding factors, additional reproduction-related end points for PCB toxicity, relevance of these results to women not undergoing IVF, and a lack of data on male factors are gaps that need to be filled in future studies.

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A Shift in Policy?

Learning from China's Environmental Challenges and Successes

Outdoor air pollution in Hong Kong SAR, Beijing, and China's other major urban centers far exceeds international health-based standards, and the top Chinese environmental regulator has classified more than half the country's water resources as too polluted for human use. Yet in 2009 China became the world's number one investor in clean energy technology, investing nearly twice as much as the United States. The situation is emblematic of China's paradoxical nature: Although this country has routinely pursued policies that promote economic growth at the expense of environmental health, in more recent years it has begun to make commitments to environmental protection, reaching milestones that set examples for U.S. and other Western policy makers [*EHP* 119(7):893–895; Remais and Zhang].

China has multiple incentives to invest in energy efficiency and alternative energy sources, including the large numbers of premature deaths linked to outdoor and indoor air pollution from highly polluting energy sources. The country has adopted strict national fuel efficiency standards for vehicles that widely exceed U.S. requirements and has paired these standards with tailpipe emissions controls that reduce traffic-related air pollution. In a bid to reduce its reliance on coal and other fossil fuels, China has increased its renewable energy production capacity by 79% since 2005 (compared with a 24% increase in the United States during the same period) and set ambitious targets to produce more than 15% of its electricity supply from renewable sources by 2020.

The authors trace China's recent progress to a surge in investments since 1991 aimed at improving environmental quality. These investments have led to increased enforcement of, and improved compliance with, existing laws governing pollution abatement, resource conservation, and ecological management. Last year, the Chinese National People's

Congress issued a \$20-billion plan for new energy technologies, ambitious energy conservation measures, and environmental protection initiatives.

But to make a comprehensive environmental protection framework really work in China, the authors contend the country must reassess its position on economic growth as the prime driver behind policy making. China must also address the dual role of the government as both regulator and polluter as well as strive for greater transparency and enforcement in environmental matters. “Progress in these regulatory areas will grant the country greater influence on the world stage,” the authors write. Even now, however, the authors assert China has lessons to offer Western policy makers as global leaders work to limit the serious environmental externalities that accompany reliance on fossil fuels.

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A Chinese worker checks a wind turbine at a plant in Zouping County, Shandong Province.